R·I·T	Title: Trion Phantom RIE	
Semiconductor & Microsystems Fabrication Laboratory	**Revision**: **F**	**Rev Date: 05/18/2022**

Approved by:

_______________/ /   _______________/ /
Process Engineer   Equipment Engineer

1 SCOPE

The purpose of this document is to detail the use of the TRION Phantom RIE. All users are expected to have read and understood this document. It is not a substitute for in-person training on the system and is not sufficient to qualify a user on the system. Failure to follow guidelines in this document may result in loss of privileges.

2 REFERENCE DOCUMENTS

- Safety Data Sheets for process gasses
- Appropriate Tool Manuals

3 DEFINITIONS

n/a

4 TOOLS AND MATERIALS

4.1 General Description

The TRION RIE is a single chamber reactive ion etcher for processing involving SF6, CF4, CHF3 and O2. The RIE will etch Nitride, Poly and several metals like moly with fluorine etching. The system has a Windows XP based operating system and the latest software available from Trion Technologies. It is not the same as the Trion Minilock and qualification on the Minilock does not qualify you on this tool.

5 SAFETY PRECAUTIONS

5.1 Hazards to the Operator

5.1.1 **Compressed Gas** - This system uses hazardous gases to process wafers.

5.1.2 **Electrical –** The system uses hazardous voltages and RF to process wafers.

5.1.3 **Mechanical Hazards –** There are pinch points on the tool. Lid opens and closes automatically.

5.2 Hazards to the Tool

5.2.1 **Wafer size** - This tool is only intended for 6” or 8” wafers and 6” or 8” carriers.

5.2.2 **Recipes** – Do not edit any recipes that begin with the letters “FAC.” These are reserved for the factory class.

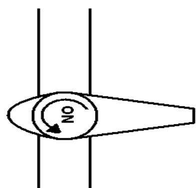
5.2.3 **Contamination** – Do not process wafers with gold or copper on them. This tool is not to be used for III-V substrates either.

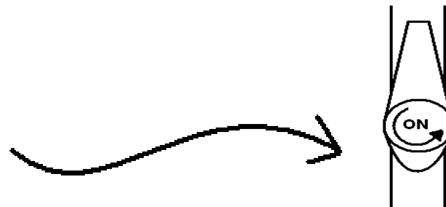
6 INSTRUCTIONS

6.1 Service Chase Setup

6.1.1 Make sure that the tool is swiped in on card swipe 1.

6.1.2 In the service chase #2715, ensure the N_2 manifold (located immediately on your right hand side as you enter the service chase) labeled "Trion Phantom" is on. The pressure should read at least 15 PSI.





OFF position **ON position**

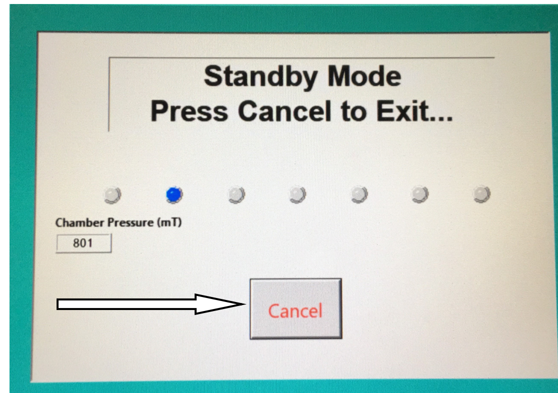
6.1.3 In the Service Chase ensure that the **POWER** on the Trion Phantom Main Power Panel is on.

6.1.4 In service chase 17-2715 turn on the **ROUGH PUMP** and **ROOTS BLOWER**.

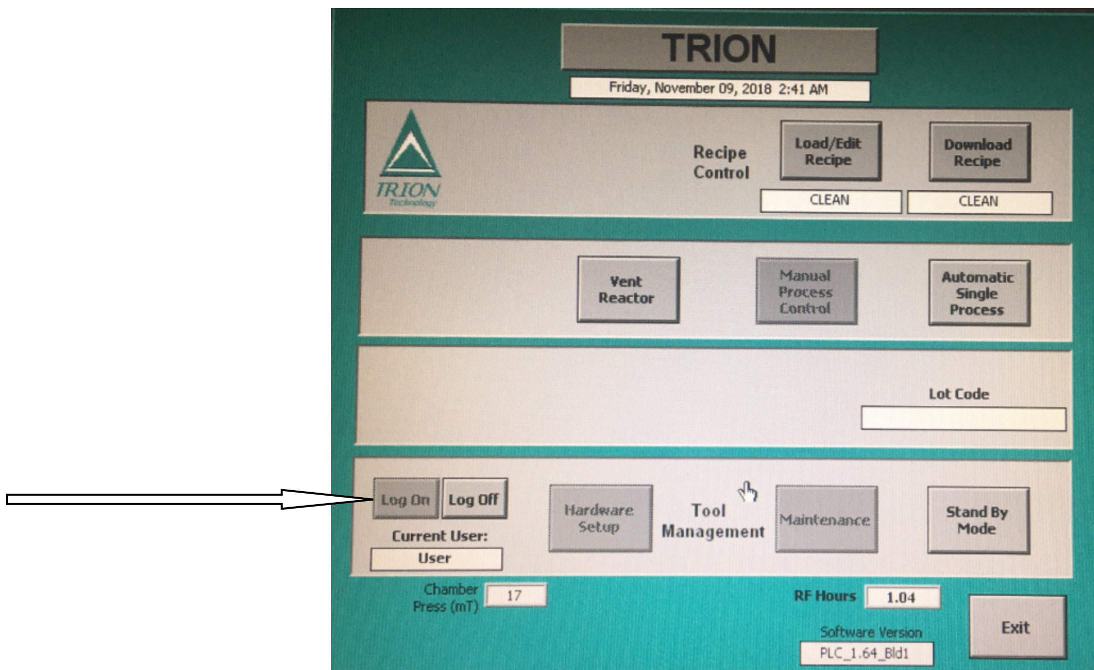
6.1.5 In service chase 17-2715 make sure the chiller is on and full. Ensure the set point of the 50/50 Propylene Glycol/D.I. water controller is set for 35°C.

6.2 Loading and Editing a Recipe

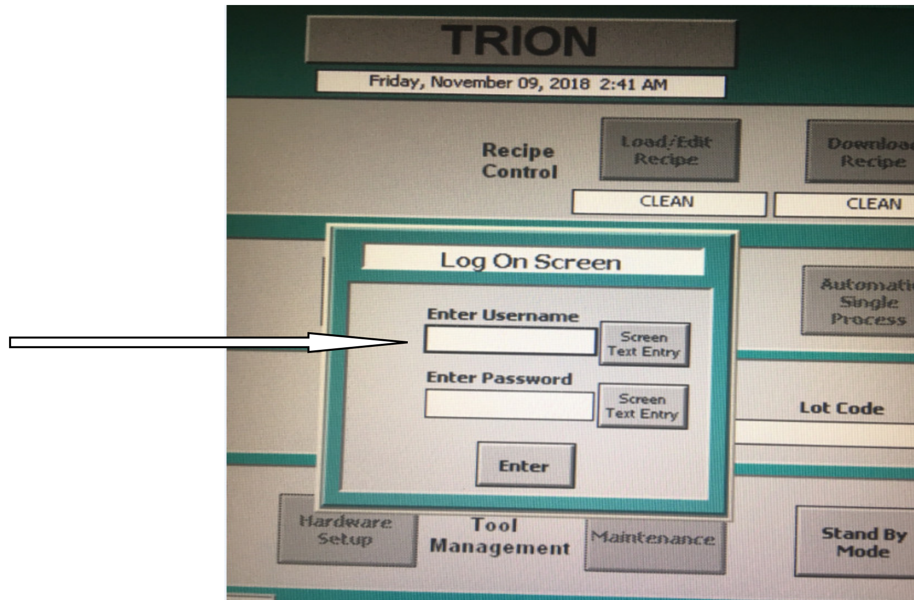
6.2.1 If the computer is in sleep mode touch the screen or press the space bar. This should show "**STANDBY MODE"**.



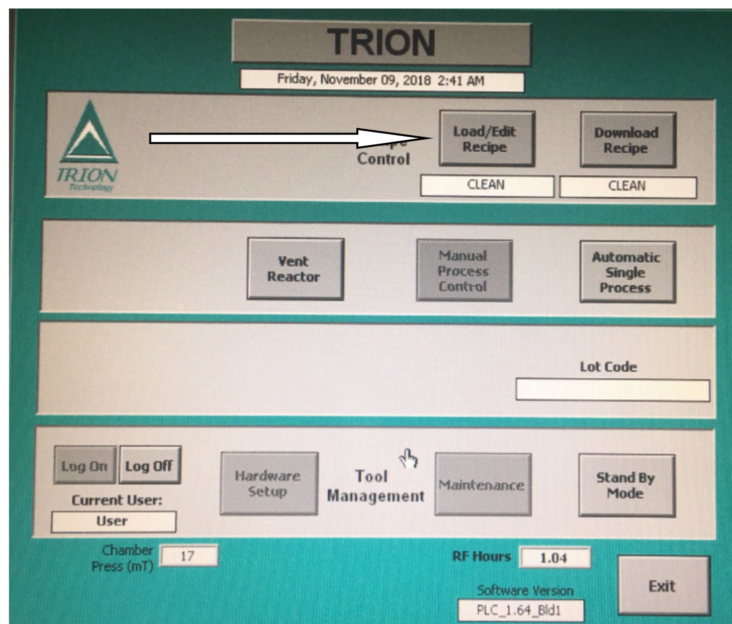
6.2.2 Hit "**CANCEL**". The **MAIN** Screen should appear. Press "**LOG ON**" at the bottom left corner.



6.2.3 Type **Process** for user name and **proc** as password. Press "**Enter**". This logs you in.

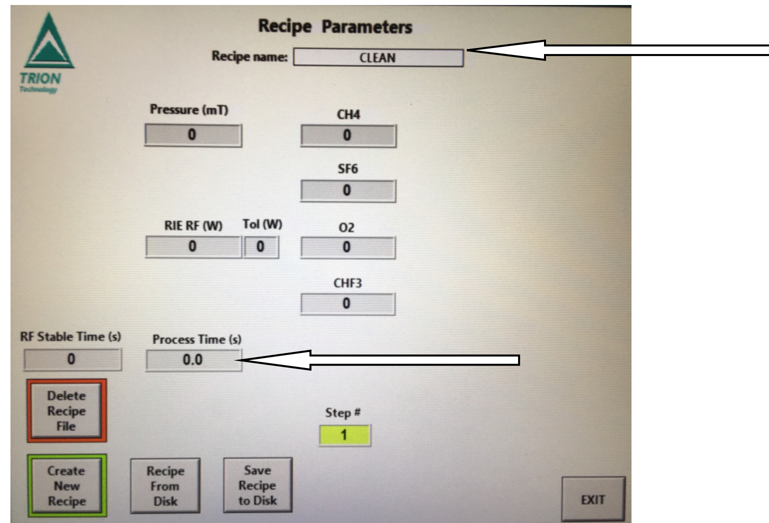


6.2.4 To load a recipe press **LOAD/EDIT RECIPE**.



6.2.5 This brings up the "**RECIPE PARAMETER"** screen. Look for the recipe name in the **WHITE** block at the top of the screen. If this is the recipe you want adjust the

time by touching the process time and a numeric touch screen appears. Type in the desired time for your etch in seconds and press “**ENTER”**.



6.2.6 Recommended Process Parameters

RF Stable Time- 30 sec.
RF Tolerance- 10W
RF Range- 0-600W

MFC max flow		**Recommended Range**
CF_4-	100sccm	20-80sccm
SF_6-	500sccm	100-400sccm
O_2-	50sccm	10-40sccm
CHF_3-	100sccm	20-80sccm

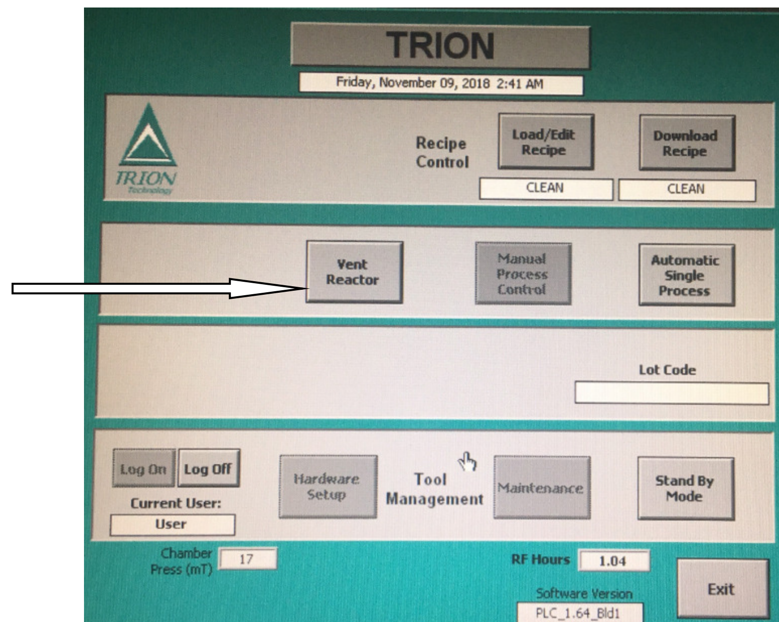
6.2.7 Press **EXIT** and the **MAIN** Screen should appear with **TRION** at the top.

6.3 Loading and Etching a Wafer

6.3.1 Before etching, run an oxygen clean for 5 minutes without a wafer and after every 15 wafers.

6.3.2 Before loading a wafer, verify that the resist has been hard baked. NOTE: DO NOT ETCH WAFERS WITH PHOTORESIST THAT HAVE NOT BEEN HARD BAKED. CONTAMINATION, POOR FEATURE QUALITY AND BURNED RESIST MAY RESULT IF NOT HARD BAKED.

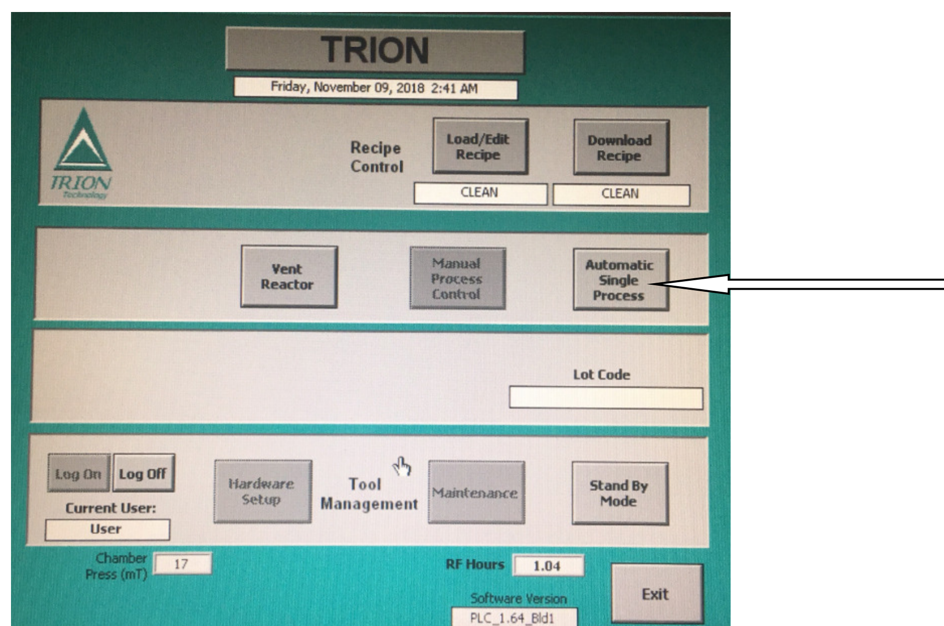
6.3.3 Press “**VENT REACTOR**” and 5 pump purge cycles will start to ensure no process gas is released, then the chamber will vent and open (about 5 minutes).



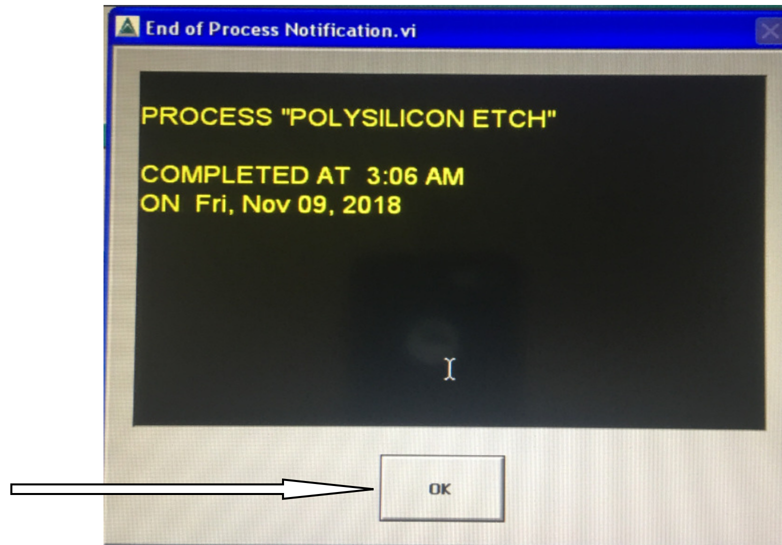
6.3.4 Load the wafer on the platen. Verify that the wafer is sitting flat on the platen. Take care to use coated tweezers as to not scratch the platen.

6.3.5 Press "**CLOSE LID**". The lid will close automatically.

6.3.6 Press "**AUTOMATIC SINGLE PROCESS".** If you use lot codes to control your processing enter it here as well as comments or notes in the bottom box. Press **"ENTER" (even if you entered nothing).** Your process will start.

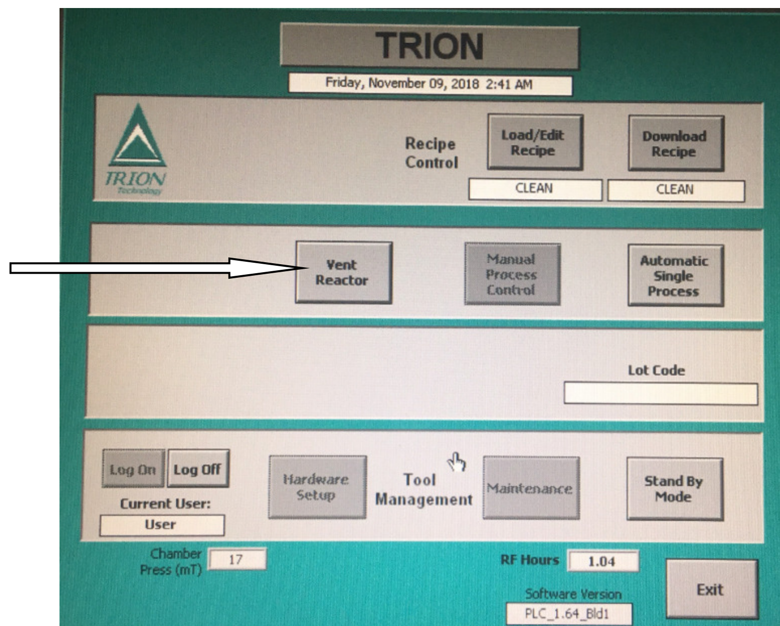


6.3.7 Press "**OK**" when the **END OF PROCESS NOTIFICATION** screen appears.



6.4 Unloading Wafer

6.4.1 Press **"VENT REACTOR"**. The 5 pump and purge cycles will start and the chamber will automatically vent and open when complete.



6.4.2 Use coated tweezers and remove your wafer. Take care not to scratch the platen.

6.4.3 If you are running multiple wafers with the same recipe and time, load the new wafer and repeat from step 6.3.4.

6.4.4 If you need to change the etch time or select a different recipe press "**LOAD / EDIT RECIPE"** and repeat from step 6.2.4.

6.5 Shutdown

6.5.1 Once you are done processing wafers, Press "**CLOSE LID"** and it returns to the TRION main screen.

6.5.2 Press "**LOG OFF"**.

6.5.3 Press "**STANDBY MODE"**.

6.5.4 Card swipe out. Leave the tool running.

6.6 Errors during Run

6.5.1 If you try to vent the chamber before you swipe in, you will get an error that the lid is not closed. Call the technician to go into maintenance mode and manual control to recover.

6.6.1 If resist burns, make sure it has been hard baked, make sure the chamber is clean and make sure the wafer is sitting flat on the platen.

7 APPROPRIATE USES OF THE TOOL

7.1 This tool is only intended for 6" or 8" wafers and carriers.

7.2 Do not process wafers with gold or copper on them. III-V and like substrates should not be processed in this tool,

8 ATTACHMENTS

REVISION RECORD

Summary of Changes	Originator	Rev/Date
Original Issue	Zak Kogut	A-11/01/2018
Updated service chase set up and added note for hard bake	Bruce Tolleson	B-06/20/2019
Updated text;	S. Blondell	C-02/06/2020
Updated with comments from P. Meller	T. Grimsley	D – 2/3/21
Added to Errors during the run.	B. Tolleson	E-01/28/2022
Reformatted, added info on process parameters, added clean requirement, added verification that wafer is sitting flat on platten	O’Brien	F-05/18/2022